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Beyond Projects: Coordination process in IT enabled programmes

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ABSTRACT

Programme management is increasingly employed by governments and industry leaders as a mechanism for achieving strategic changes of significant complexity. Yet, research on programme management in general, and information technology (IT) enabled programmes specifically, is scarce. A common justification of programme management approach is its ability to coordinate across multiple projects and operational activities which are interrelated or interdependent, thus making coordination a central concept in programme management. Despite its importance, the process of coordination in programme management has remained unexplored. Based on a review of IS literature on coordination, a research study has been designed which aims to develop a process model of coordination in IT enabled programmes. This study will make research contribution to the understudied area of programme management and to programme management practice by explaining how coordination concretely occurs in IT enabled programmes. By taking the neglected *whole-of-process* approach, this study will also contribute to coordination research.

Keywords

Programme management, coordination theory, process approach

INTRODUCTION

A programme is traditionally defined as "a group of projects that are managed in a coordinated way to gain benefits that would not be possible were the projects to be managed independently" (Ferns 1991, p. 149). Most programme definitions define programmes in terms of coordination of interdependent or interrelated projects and operational activities that aim to achieve a major strategic outcome for the organisation (such as Caldwell 2003; Cash Jr. et al. 2008; Maylor et al. 2006; McElroy 1996; Parolia et al. 2011; Pellegrinelli 2011 and many others). Specifically, IT programmes have been defined as "concerted IT-dependent strategic efforts to increase the ability of an organization to address its future business environment and compete more effectively with IT" (Gregory et al. 2015, p. 57). Although the overall interest in the understudied area of programme management is gradually increasing in IS literature (such as Gregory et al. 2015; Jiang et al. 2014; Parolia et al. 2011), we still know very little about the nature of programme management challenges and how to manage them (Gregory et al. 2015; Jiang et al. 2014). Since coordination across projects and related operations is cited as the raison d'être for programmes, we aim to explore how programme management executives coordinate work activities, teams, and resources in IT enabled programmes.

Coordination is of extreme importance for success of IS projects especially when the project are complex and involve significant uncertainty and high time constraints (Mastrogiacomo et al. 2014). These characteristics exhibit prominently in IT enabled programmes (Pellegrinelli 1997; Thiry 2002) increasing the importance of coordination in IT enabled programmes manifold. However, no specific study of coordination in IT enabled programmes has been found in the literature. This study therefore, seeks to answer the following "grand tour" (Creswell 1998, p. 99) research question:

How does the programme management team ensure that various constituent elements of the programme are doing the required work at the required time to achieve the programme objective?

The aim is to find out, in the programme management team, who does what actions when and under what conditions, which constitute the process of coordination. We intend to develop a holistic process model describing the sequence of events, actions, states, conditions and consequences that enact coordination.

In the following sections we define programmes and coordination and highlight the importance of coordination in programme management. Then we discuss findings of the literature review and conclude by presenting our research design and expected contribution.

DEFINITIONS

Programmes

Since we intend to undertake a field study in the context of IT enabled programmes, it is critical for us to know what qualifies as an IT enabled programme (as opposed to a project or portfolio) so that we can choose the right context for our study. We, therefore, collected and synthesised various programme definitions from the literature in the form a concept matrix given in Appendix A. These concepts can be grouped in three categories: *significant-effort, multi-project synergy,* and *strategic intent* (Khan et al. 2014). By combining these categories we define a programme to be *a significantly large effort that is strategically important and comprises of a number of projects and related activities*. IT enabled programme can thus be defined as *the significant effort exerted by an organisation to realise a transformational strategic objective using IT as the key enabler*. The objective of a programme is transformational because it brings about substantial changes in organisational culture, processes, and/or structure (Artto et al. 2009). It is strategic because it helps organisations position themselves in the market as they envisage for their business model (Gregory et al. 2015). This definition is consistent with recent conceptualisations of IT enabled programmes such as Gregory et al. (2015).

Coordination

Due to the usage of the term *coordination* in a vague manner referring to various management activities that are conceptually different (such as collaboration or cooperation), it is important to specify our conceptual understanding of coordination to provide boundaries of literature review and subsequent research study. Meriam-Webster[2] dictionary defines coordination as "the process of organizing people or groups so that they work together properly and well." We use the term coordination conceptualised as the process of "how collective work is accomplished" in organisations (Okhuysen and Bechky 2009, p. 464) i.e. the process of making different people and organisational units work together to achieve an organisational objective. Based on this delimitation, the literature on inter-firm coordination (e.g. (Wang and Tai 2003)) and supply chain coordination (e.g. (Tan et al. 2014)) was excluded.

Table 1 lists various definitions of coordination. Coordination is traditionally defined as "integrating or link-ing together different parts of an organization to accomplish a collective set of tasks" (Van De Ven et al. 1976, p. 322). But this definition does not emphasise the emerging, situationally unfolding nature of coordination (explained later in literature review section) focused upon in our research, therefore, we adopt the following definition to enable us to explore the emergent aspects of coordination:

Coordination is "(a) temporally unfolding and contextualized process of input regulation and interaction articulation to realize a collective performance" (Faraj and Xiao 2006, p. 1157)

	Definition
Van De Ven et al. (1976)	"[I]ntegrating or linking together different parts of an organization to accomplish a collective set of tasks" (p. 322)
Argote (1982	"Coordination involves fitting together the activities of organization members, and the need for it

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[2] http://www.merriam-webster.com/dictionary/coordination accessed 12 Feb 2015. The same dictionary defines 'cooperation' as "a situation in which people work together to do something" and 'collaboration' as "to cooperate with an agency or instrumentality with which one is not immediately connected". While cooperation and collaboration may be required for effective coordination, they are not the focus of our study.

	arises from the interdependent nature of the activities that organization members perform" (p. 423)
Malone and Crowston (1990	"[T]he act of working together harmoniously" (p. 358). "[T]he act of managing interdependencies between activities performed to achieve a goal" (p. 361)
Bailetti et al. (1994)	"[W]e define coordination structure as the entire set of interrelated interdependencies between all of the individuals and groups in some problem domain" (p. 395)
Kraut and Streeter (1995)	"Coordination has been defined as the direction of 'individuals' efforts toward achieving common and explicitly recognized goals" … "In software development, it means that different people working on a common project agree to a common definition of what they are building, share information, and mesh their activities" (p. 69)
McGrath et al. (1999)	"Coordination of interests refers to the functional interconnections between member interests and goals and group interests and goals" (p.1) "Coordination of understandings refers to the development of shared perceptions and meanings among members, including an appreciation of the ways in which members reliably see and interpret events differently" (p.1) "Coordination of action is a synchronization and sequencing of member actions in time and place" (p.2)
Ballard and Seibold (2003)	"Coordination can be defined as the collective accomplishment of individual goals through a cooperative process" (p. 401)
Quinn and Dutton (2005)	"Coordination is the process through which people arrange actions in ways that they believe will enable them to accomplish their goals" (p. 36)
Faraj and Xiao (2006)	"At its core, coordination is about the integration of organizational work under conditions of task interdependence and uncertainty" (p. 1156) "A temporally unfolding and contextualized process of input regulation and interaction articulation to realize a collective performance" (p. 1157)
Fussell et al. (1998)	"The extra work organizations and individuals must complete when individuals are working in concert to accomplish some goal, over and above what they would need to do to accomplish the goal individually" (p. 3)
Dietrich et al. (2013)	"We consider coordination an information-processing activity, which is closely related to communication and shared meaning" (p. 6)
Hsu et al. (2012)	"Coordination in [information system development] ISD refers to stakeholders working on a common project agreeing to a common definition of what they are building, sharing information, and meshing their activities."(p. 331)
Rico et al. (2008)	"Coordination in work teams is … the use of strategies and behavior patterns aimed at integrating and aligning the actions, knowledge, and objectives of interdependent members, with a view to attaining common goals" (p.163)
Leidner et al. (2009)	"Coordination is the mechanism that enables an organization to transform existing resources into actions" (p. 91)

Table 2: Various Coordination definitions

Coordination and Programme Management

There are several studies of coordination in project environment but project concepts cannot be directly applied to programmes (Lycett et al. 2004; Pellegrinelli et al. 2015). Doing so leads to failure of large number of programmes (Pellegrinelli 2011) due to significant differences between projects and programmes summarised in Table 2. For example, we know that competence attributes required for effective programme management are distinct and additional to those required for effective project management (Partington et al. 2005). Furthermore, individual project's success is measured by how well it meets requirements, deadlines, and budgets (Ribbers and Schoo 2002), but the success of a project under a programme is determined by how well it contributes to the overall programme objective (Gregory et al. 2015). It has been argued that project management concepts need significant refining and adaptation before applying to programmes (Pellegrinelli 2011) which necessitates dedicated study of programme coordination as a separate phenomenon.

While project management research doesn't apply directly to programmes, it can be used to gauge importance of coordination for programmes. Coordination is the mediator between project planning and project success (Zippel-Schultz and Schultz 2011). Project management office performs three roles in a multi-project organisation: supporting, controlling and coordinating. But its coordinating role is most important since the impact of the other two on project success is much less (Unger et al. 2012). Furthermore, coordination role of middle managers is most significant for effective management of programmes in contrast to projects and portfolios (Blomquist and Müller 2006). In short, coordination process acts as the glue that holds the entire programme management effort together. Therefore, better understanding of this process is crucial for both research and practice.

Characteristic	Distinctiveness of programs	Distinctiveness of projects
1. Themes	*Several topical and focused themes* of management science: manufacturing, quality, work and organization change, product development	*One dominant theme*: product development
2. Evolutionary pattern of themes	*Emphases of different themes change in time*. Major changes in industry and society introduce contemporary themes that programs are expected to address	*Evolution within the same thematic line* of literature, product development
3. Dominant theory bases	*Organizational theories and strategy*	*Product development*
4. Additional theory bases	*Several additional theory bases*: product development, manufacturing, quality, and industrial, economic, institutional, work and organizational change	*Organizational theories*
5. Missing theory basis	*Ignorance of original theoretical roots of program and project management*	*Ignorance of original theoretical roots of program and project management*
6. Evolutionary pattern of theory bases	*Evolution towards a balance*. Within organizational theories, evolution towards balance between alternative theories. Between dominant and additional theory bases, from organization theory focus towards more balance among themes	*Increasing focus in product development*
7. Level of analysis	*Organization and its major parts*. However, no evident focus on multi-project organizing	*Single project*
8. Object	*Change of permanent organization*	*Narrowly defined task entity or organizational entity that is temporary*. Permanent organization is taken as given, serving as an influence factor of project success
9. System	Systems thinking	No systems thinking
10. Types of innovation	*Various types of innovations that reflect an open system nature of organizations in their environments*. For example, process innovation, organizational innovation and change, infrastructure and systems innovation	Product innovation
11. Types of outcome	*Wide set of impacts*. Broader, fuzzier and more indirect and far-reaching effects with long-term implications in the future	*Concrete business results*. Direct results that contribute in a foreseeable manner to business success. Focus is on short-term outputs (project or product success)

Table 3: Eleven distinctive characteristics of programs and projects (Artto et al. 2009, p. 9)

LITERATURE REVIEW

Traditional coordination research has focused on the effects of different coordinating mechanisms, such as plans and schedules (Moenaert and Souder 1990), reward systems (Menon et al. 1997), electronic mail (Markus 1994), electronic data management (Sicotte and Langley 2000), common information display (Bordetsky and Mark 2000), colocation of key individuals (Pinto et al. 1993), integrating groups (Daft and Lengel 1986), direct informal contacts (Souder and Moenaert 1992), workplace rotation (Ettlie 1995) and the adoption of commonly agreed values (Hart and Banbury 1994).

The importance of coordination is increasing as organizations become reliant on interdisciplinary teams of specialists and distributed operations using IT (Faraj and Xiao 2006). Due to the shift from manufacturing to service industry in knowledge economies (Okhuysen and Bechky 2009) work in organizations now takes place in work groups making coordination less dependent on structural mechanisms (Faraj and Xiao 2006). Knowledge workers need to develop processes that respond to coordination challenges as they emerge while carrying out pieces of work each different from the past. A gap exists between the traditional view of coordination as structural mechanisms and coordination as an unfolding process (Faraj and Xiao 2006; Okhuysen and Bechky 2009). Focussed on formal planning and design of work activities, traditional coordination research fails to account for unplanned and emergent contingencies. To deal with this issue organisational researchers developed black-boxed coordination categories such as *work groups* (Van de Ven et al. 1976), *ad-hoc coordination* (Donaldson 2001) and *mutual adjustment* (Thompson 1967). It is only recently that organisational researchers have sought to open these black-boxes and devoted their attention to the emergent nature of coordination in complex, interdependent work in organisations. Our study is also a step in this direction.

IS Studies on Coordination

Following Xiao et al. (2013) and Dubé and Paré (2003), a systematic review of coordination in IS literature was carried out. Highly reputed IS journals were selected as well as those related to the phenomenon of interest i.e. project and programme management, as given in Table 3. As mentioned earlier, the literature on programme management in general and IT enabled programmes in particular is very little thus all IS coordination research except, the areas expressly excluded, needed to be taken into account. Also non-IS coordination research on project and programme management was included due to its relevance to the context.

	Journal	Number of articles finally selected
1	European Journal of Information Systems (EJIS)	1
2	Information Systems Journal (ISJ)	1
3	Information Systems Research (ISR)	2
4	Journal of the Association for Information Systems (JAIS)	4
5	Journal of Information Technology (JIT)	1
6	Journal of Management Information Systems (JMIS)	5
7	Journal of Strategic Information Systems (JSIS)	2
8	Management Information Systems Quarterly (MISQ)	3
9	Project Management Journal (PMJ)	1
10	International Journal of Project Management (IJPM)	6

Table 4: Distribution of selected articles

Identification of relevant articles

The keywords used for databases searches were "coordination" and "co-ordination". The search was conducted using Scopus (http://www.scopus.com/). Initial search yielded 184 articles in the past 25 years (i.e. since 1990). These articles were later shortlisted based on their relevance. Majority of articles were dropped because they only used coordination in peripheries and it was not the focus of the research. For example Lacity et al. (2009) mentions increased coordination costs as an inhibiting factor for IT outsourcing but the issue of coordination is not explored any further. Likewise, Gregory et al. (2015) doesn't deal with coordination in any depth. This purging yielded a final list of 26 articles. Appendix B summarises reviewed articles and highlights shortcomings with respect to our proposed study.

Adapted from Dubé and Paré (2003) and Xiao et al. (2013) five criteria were used for organisation of the review as given in Table 5. The categories were chosen to identify the prevalent trends in IS coordination research to see which areas have received more attention and consequently highlight what our study should focus on. Table 5 summarises the distribution of articles in review categories.

	Criterion	Category	Number		Percentage	
1	Context	Project Management	17		65	
		Programme Management	1		4	
		Firm level/cross-functional/cross-unit	8		31	
2	Perspective on the nature of coordination	Task based	8		31	
		Information sharing	8		31	
		Integrative	8		31	
		Process-Integrative	2		8	
3	Level of analysis	Individual	1		4	
		Groups/teams/subunits	23		88	
		Not restricted to unit (process study)	2		8	
4	Logical structure	Variance	20		77	
		Process	2		8	
		Not discernible	4		15	
5	Methodology	Survey	3		12	
		Case study (single/multiple)	12		46	
		Descriptive		6		23
		Explanatory/confirmatory		4		15

		Exploratory		2		8
		Secondary data analysis	1	4		
		Design science	2	8		
		Action research	1	4		
		Experiment	2	8		
		Simulation/Data clustering/Dependency modelling	4	15		
		Interview	1	4		

Table 5: Distribution of articles in categories of review

KEY FINDINGS

Extending Beyond Projects

Table 4 reveals that most studies have taken place in the context of project management (65%). There has only been one study in programme management environment ((i.e. Rijke et al. 2014) but in the context of infrastructure engineering. Coordination challenges become even greater in programmes because multiple projects and routine operations need to contribute to an overarching business objective. For example programme management needs to address constant paradoxical tension between output focus of projects and outcome focus of the overall programme (Rijke et al. 2014). IT projects, while focusing on their own deadlines, may lose the bigger picture of their contribution to overall programme (Gregory et al. 2015). This leads to other projects suffering from interdependent components not being delivered as scheduled thus creating additional coordination requirements in programmes. The existing lack of research specifically focused on coordination in IT programmes, justifies the proposed research.

Changing Perspective on Coordination

Table 5 summarises three coordination perspectives found in the reviewed articles: task based, information sharing, and integrative. Task based perspective relies on explicit coordination mechanisms. Such research identifies various structural arrangements, organisational configurations, standards, rules and procedures aimed at resolving interdependencies and conflicts among organisational actors, resources and functions. Task based perspective of coordination focuses on how tasks are divided and integrated among different organizational units (Chua and Yeow 2010). Such division of tasks is dependent upon variables such as uncertainty in the environment or tasks (Chua and Yeow 2010), ambiguity of available information about the task (Dietrich et al. 2013), and the degree of interdependence among tasks (Keith et al. 2013).

Perspective	Underlying assumption	Reviewed articles
Task based/structural	Coordination can be achieved by organisational design considerations utilising various structural mechanisms dependent upon contingencies of complexity and uncertainty	8 studies (Gosain et al. 2005), (Rijke et al. 2014), (Hossain 2009), (Hossain 2009), (Mani et al. 2014), (Colazo and Yulin 2010), (Keith et al. 2013), (Dibbern et al. 2008)
Information sharing	Coordination problems can be overcome by developing a shared understanding of organisational work	8 studies (Ahern et al. 2014), (Adenfelt 2010), (Wiredu 2011), (Lowry et al. 2009), (Mastrogiacomo et al. 2014), (Abraham and Junglas 2011), (Leidner et al. 2009), (Dietrich et al. 2013)

Integrative	The idiosyncratic complexities of organisational work produce coordination challenges that cannot be overcome by structural arrangements or information sharing activity alone. It is possible to explain a larger set of coordination contingencies by combining the two approaches	8 integrative studies (Hsu et al. 2012), (Cummings et al. 2009), (Ning and Johnston 2009), (Napier et al. 2011), (Ren et al. 2008), (Espinosa et al. 2007), (Andres and Zmud 2001), (Tillquist et al. 2002)
	Coordination of complex, multi-actor, collective work is an emergent, contextualised process. The required mechanisms and information needs of coordination challenges cannot be completely predicted and coordination response needs to be negotiated on the fly	2 process integrative studies (Chua and Yeow 2010), (Williams and Karahanna 2013)

Table 6: Three perspective of coordination

Also referred to as structural perspective, task based view asserts that there is a degree of predictability in environment that allows a-priori identification of interdependencies among tasks and environments. This a-priori identification enables organisations to design predefined coordination mechanisms based on various contingencies (Faraj and Xiao 2006; Jarzabkowski et al. 2012). Task based coordination research seeks to understand the modes of coordination that can be applied to specific configuration of tasks, interdependence, and environmental uncertainty (Chua and Yeow 2010). Task based coordination is ineffective when the nature of work is "less routinized, less analysable, and less familiar" (Mani et al. 2014, p. 846).

The second perspective maintains that coordination is an information sharing activity and relies on ongoing communication and development of shared meaning (Dietrich et al. 2013). It is also called implicit coordination. Interdependencies among tasks are resolved by information sharing mechanism such as feedback (Parolia et al. 2011), information display devices (Tillquist et al. 2002), shared mental models (Lowry et al. 2009), and establishment of common ground (Mastrogiacomo et al. 2014). Coordination mechanisms based on information sharing are effective when the underlying work is less familiar to the team (Mani et al. 2014).

Both task-based and information sharing coordination perspectives consider the coordination mechanisms in an organisation as given (reified) and study their effects on project success and their typological configurations. For example, based on past research Dietrich et al. (2013) identifies three different configurations of coordination mechanisms: *centralised*, *decentralised* and *balanced* based on group mode of personal coordination, individual mode of personal coordination, and impersonal mode of coordination (Kraut and Streeter 1995; Van De Ven et al. 1976).

To explain a wider set of contingencies, several IS studies combine elements of structural and information sharing perspectives to create integrative view such as Figure 1. The premise is that organisational structures and a-priori planning is not enough individually to achieve effective coordination and therefore, they need to be aided by information sharing activity that develops shared understanding. Most frequently such studies combine Coordination Theory (Malone and Crowston 1994) to explain the structural elements with some other theory that explains knowledge sharing elements. While information sharing and structural mechanisms related contingencies are explored in such integrative studies, these studies do not explain why and how these arrangements work (Okhuysen and Bechky 2009). These studies contribute to explaining parts of coordination process but none takes a *whole-of-process* approach advocated by Crowston (2000) and therefore, fail to take into account the emergent nature of unplanned coordination for problems that remain unpredicted.
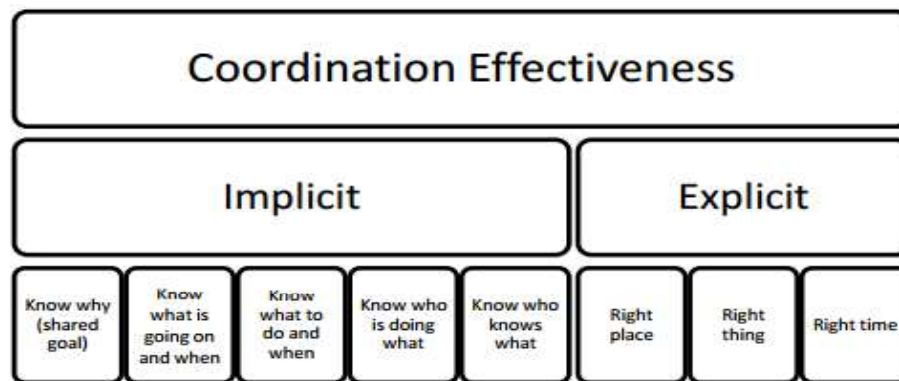
Figure 3: integrating coordination mechanisms (Strode et al. 2012, p. 1234)

More recently there have been two IS studies where research has adopted a process integrative perspective, which seeks to combine both task based and information sharing perspectives while also taking into account the emergent nature of coordination. Williams and Karahanna (2013) explains how coordination structures and mechanism are created and modified as part of enterprise wide IT governance. Second example is Chua and Yeow (2010) which studies coordination practices of open source software development. Our study of programme coordination will adopt process integrative perspective to provide holistic picture of how work in IT enabled programmes is coordinated.

Theory development

Half of the reviewed studies (13) referred to Coordination Theory (Malone and Crowston 1994) which defines coordination as the management of dependencies between activities. While Coordination Theory offers alternative mechanisms for resolving interdependencies, it does not explain why these alternatives are substitutes (Okhuysen and Bechky 2009). Furthermore, the state of coordination cannot be maintained indefinitely due to instabilities in the environment and change of actors, tasks and activities (Williams and Karahanna 2013) but Coordination Theory, relying on predetermined patterns of interdependencies among organisational units, does not offer the best explanations in dynamic environments (Faraj and Xiao 2006) such as IT enabled programmes. Therefore, deeper understanding can be gained by context specific substantive theorisation of coordination (Crowston 1997).

Methodological diversity and process approach

The favoured research method in reviewed articles is case study (12 articles (46%)) but most case studies are descriptive and explanatory (theory-driven). There is only one exploratory inductive theory building case study (i.e. (Chua and Yeow 2010)). Therefore, we argue the need for exploratory case study research as it offers excellent theory building potential (Eisenhardt and Graebner 2007). Majority (77%) of reviewed studies follow variance approach in the sense of Newman and Robey (1992). But variance studies do not explain the temporally unfolding nature of coordinating activities (Bechky 2006). This problem can be resolved by adopting the process approach (Crowston 2000). Process is a temporal sequence by which conditions, events, and states unfold (Spector and Meier 2014). It is a series of actions, operations, or functions continuously performed over the course of time in order to produce, develop, or treat a change towards an outcome (Demir and Lychnell 2015).

Process theorisation is recommended for complex situations with multiple units of analysis where boundaries of units are ambiguous (Langley and Abdallah 2011; Langley et al. 2013). This is clearly the case with coordination research where variance based studies have struggled to combine aspects of individual information processing with organisational structures. Process approach is recommended when the phenomenon of interest is of paradoxical nature (Langley et al. 2013) which is a defining characteristic of IT enabled programmes (Gregory et al. 2015). Also, process theories are more useful for practitioners (Crowston 2000).

RESEARCH DESIGN

Based on literature review, three conclusions can be made: coordination research in IT enabled programmes is needed; such study should adopt theory development paradigm; and take process perspective. These requirements call for a research method that is capable of producing substantive theory in the form of a process model. Grounded Theory Method (GTM) satisfies all these requirements. GTM is ideally suited to discovering process (Charmaz 1983; Creswell 2007) and being ontologically neutral (Urquhart and Fernández 2013; Walsh et al. 2015) allows investigating both the structural mechanisms and emergent aspect of coordination simultaneously. The study will span multivariate units of analysis as we follow the process rather than just one unit (Glaser 1998).

GTM is preferred for exploratory research in complex organisational situations where prior theories are absent or inadequate (Orlikowski 1993) which is the case in IT enabled programme coordination. GTM studies help bridge the theory-practice gap (Locke 2001). Furthermore, GTM will allow true exploration of the phenomenon because the decision on using any theoretical lens will be based on the emergent findings.

Our field study can be characterised as a multi-method research design with one dominant type (Mingers 2001) in which one method – GTM – serves as the main approach with contributions from another method – interpretive case study (Walsham 1995). While GTM is the overarching data collection and analysis method, data will be organised in the form of multiple case studies (Fernandez and Lehmann 2011) as shown in Figure 4 The exact number of cases will be decided by theoretical sampling process but we plan to conduct at least 3 cases. Data will be collected primarily by semi-structured interviews but document analysis, field observation, and focus groups will also be conducted. Initially, two groups of participants will be interviewed: those who coordinate the programme (e.g. programme managers) and those whose work is coordinated (e.g. project managers). Theoretical sampling principle of GTM will decide which other persons to interview next and the process will continue till theoretical saturation is reached. Being exploratory study, the interview questions are as open as possible to elicit rich responses (Charmaz 2006; Perry 1998) and interview protocol will be modified if needed after each slice of data collection and analysis based on the questions raised during memoing. A traceable audit trail of research tasks and outcomes on the lines of (Gregory et al. 2013) will be maintained.

Due to the exploratory and GTM based underpinnings, we cannot speculate what the process model of coordination in IT enabled programmes will look like. However, based on Mackenzie (2000) we expect to see a number of states on a time continuum ranging from complete coordination breakdown to ineffective coordination and up to effective coordination, with possibly other states in between. These states will be linked by a network of activities that produce these states and condition considerations that are necessary for bringing the states about. The model will be explained in graphical form of boxes and arrows (Langley et al. 2013).
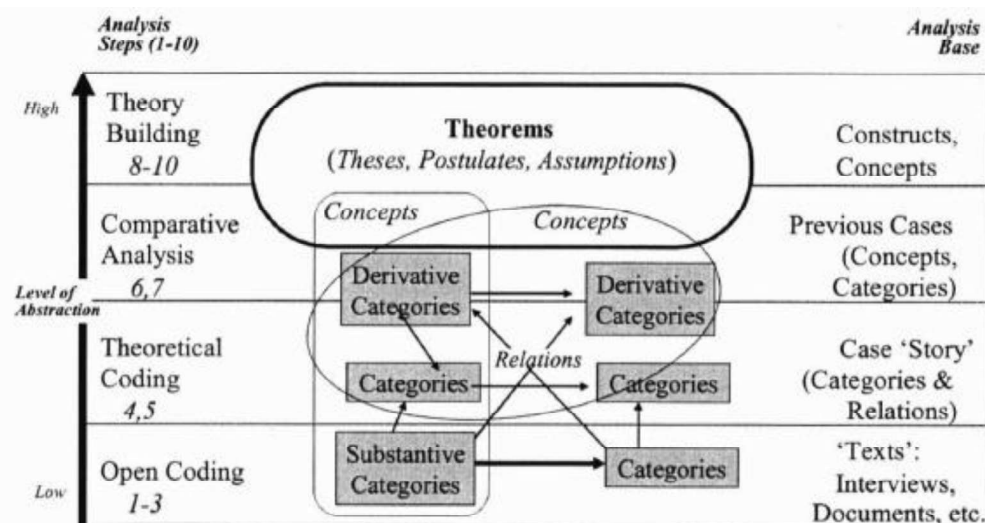

Figure 4: Theory building using case studies in GTM (Fernandez and Lehmann 2011, p. 12)

CONCLUSION, NEXT STEPS, AND EXPECTED CONTRIBUTION

The importance of coordination for IT enabled programmes along with the dearth of literature on programme management motivate this study. This paper presented a literature review of IS coordination literature and justified the need for developing a process model of coordination in IT enabled programmes. Towards this end, a GTM based field study has been designed. We are negotiating access with potential case study organisations in Australia to begin the first case study. Alongside, we will also continue efforts for securing access to further cases to enable cross case analysis.

This study will contribute to project and programme management research by responding to the calls for more substantive theory development in these areas (Artto et al. 2009; Söderlund 2004). By explaining an important aspect of programme management, this study will extend the small body of knowledge on IT enabled programmes. By developing a process model it will address calls for more IS research with process approach (Markus and Robey 1988; Söderlund 2004), and more coordination research with process perspective (Crowston 2000; Williams and Karahanna 2013).

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REFERENCES

Abraham, C., and Junglas, I. 2011. "From Cacophony to Harmony: A Case Study About the Is Implementation Process as an Opportunity for Organizational Transformation at Sentara Healthcare," *The Journal of Strategic Information Systems* (20:2), pp. 177-197.

Adenfelt, M. 2010. "Exploring the Performance of Transnational Projects: Shared Knowledge, Coordination and Communication," *International Journal of Project Management* (28:6), pp. 529-538.

Ahern, T., Leavy, B., and Byrne, P. J. 2014. "Complex Project Management as Complex Problem Solving: A Distributed Knowledge Management Perspective," *International Journal of Project Management* (32:8), pp. 1371-1381.

Andres, H. P., and Zmud, R. W. 2001. "A Contingency Approach to Software Project Coordination," *Journal of Management Information Systems* (18:3), pp. 41-70.

Argote, L. 1982. "Input Uncertainty and Organizational Coordination in Hospital Emergency Units," *Administrative Science Quarterly* (27:3), pp. 420-434.

Artto, K., Martinsuo, M., Gemünden, H. G., and Murtoaro, J. 2009. "Foundations of Program Management: A Bibliometric View," *International Journal of Project Management* (27:1), pp. 1-18.

Bailetti, A. J., Callahan, J. R., and DiPietro, P. 1994. "A Coordination Structure Approach to the Management of Projects," *Engineering Management, IEEE Transactions on* (41:4), pp. 394-403.

Ballard, D. I., and Seibold, D. R. 2003. "Communicating and Organizing in Time: A Meso-Level Model of Organizational Temporality," *Management Communication Quarterly* (16:3), pp. 380-415.

Bechky, B. A. 2006. "Gaffers, Gofers, and Grips: Role-Based Coordination in Temporary Organizations," *Organization Science* (17:1), pp. 3-21.

Blomquist, T., and Müller, R. 2006. "Practices, Roles, and Responsibilities of Middle Managers in Program and Portfolio Management," *Project Management Journal* (37:1), pp. 52-66.

Bordetsky, A., and Mark, G. 2000. "Memory-Based Feedback Controls to Support Groupware Coordination," *Information Systems Research* (11:4), pp. 366-385.

Caldwell, R. 2003. "Models of Change Agency: A Fourfold Classification," *British Journal of Management* (14:2), pp. 131-142.

Cash Jr., J. I., Earl, M. J., and Morison, R. 2008. "Teaming up to Crack Innovation & Enterprise Integration," *Harvard Business Review* (86:11), pp. 90-100.

Charmaz, K. 1983. "The Grounded Theory Method: An Explication and Interpretation," in *Contemporary Field Research: A Collection of Readings,* R.M. Emerson (ed.). Boston: Little, Brown and Company, pp. 109-126.

Charmaz, K. 2006. *Constructing Grounded Theory: A Practical Guide through Qualitative Analysis*. London: Sage.

Chua, C. E. H., and Yeow, A. Y. K. 2010. "Artifacts, Actors, and Interactions in the Cross-Project Coordination Practices of Open-Source Communities," *Journal of the Association for Information Systems* (11:12), pp. 838-867.

Colazo, J. A., and Yulin, F. 2010. "Following the Sun: Temporal Dispersion and Performance in Open Source Software Project Teams," *Journal of the Association for Information Systems* (11:11), pp. 684-707.

Creswell, J. W. 1998. *Qualitative Inquiry and Research Design: Choosing among Five Designs*. Thousand Oaks, CA: Sage Publications.

Creswell, J. W. 2007. *Qualitative Enquiry and Research Design: Choosing among Five Approaches*, (2nd ed.). Thousand Oaks, CA: Sage Publications.

Crowston, K. 1997. "A Coordination Theory Approach to Organizational Process Design," *Organization Science* (8:2), pp. 157-175.

Crowston, K. 2000. "Process as Theory in Information Systems Research," in *Organizational and Social Perspectives on Information Technology,* R. Baskerville, J. Stage and J. DeGross (eds.). Springer US, pp. 149-164.

Cummings, J. N., Espinosa, J. A., and Pickering, C. K. 2009. "Crossing Spatial and Temporal Boundaries in Globally Distributed Projects: A Relational Model of Coordination Delay," *Information Systems Research* (20:3), pp. 420-439.

Daft, R. L., and Lengel, R. H. 1986. "Organizational Information Requirements, Media Richness and Structural Design," *Management Science* (32:5), pp. 554-571.

Demir, R., and Lychnell, L.-O. 2015. "Mangling the Process: A Meta-Theoretical Account of Process Theorizing," *Qualitative Research* (15:1), pp. 85-104.

Dibbern, J., Winkler, J., and Heinzl, A. 2008. "Explaining Variations in Client Extra Costs between Software Projects Offshored to India," *MIS Quarterly* (32:2), pp. 333-366.

Dietrich, P., Kujala, J., and Artto, K. 2013. "Inter-Team Coordination Patterns and Outcomes in Multi-Team Projects," *Project Management Journal* (44:6), pp. 6-19.

Donaldson, L. 2001. *The Contingency Theory of Organizations*. Sage.

Dubé, L., and Paré, G. 2003. "Rigor in Information Systems Positivist Case Research: Current Practices, Trends, and Recommendations," *MIS Quarterly* (27:4), pp. 597-636.

Eisenhardt, K. M., and Graebner, M. E. 2007. "Theory Building from Cases: Opportunities and Challenges," *Academy of Management Journal* (50:1), pp. 25-32.

Espinosa, J. A., Slaughter, S. A., Kraut, R. E., and Herbsleb, J. D. 2007. "Team Knowledge and Coordination in Geographically Distributed Software Development," *Journal of Management Information Systems* (24:1), pp. 135-169.

Ettlie, J. E. 1995. "Product-Process Development Integration in Manufacturing," *Management Science* (41:7), pp. 1224-1237.

Faraj, S., and Xiao, Y. 2006. "Coordination in Fast-Response Organizations," *Management Science* (52:8), pp. 1155-1169.

Fernandez, W. D., and Lehmann, H. 2011. "Case Studies and Grounded Theory Method in Information Systems Research: Issues and Use," *Journal of Information Technology Case and Application Research* (13:1), pp. 4-15.

Ferns, D. C. 1991. "Developments in Programme Management," *International Journal of Project Management* (9:3), pp. 148-156.

Fussell, S. R., Kraut, R. E., Lerch, F. J., Scherlis, W. L., McNally, M. M., and Cadiz, J. J. 1998. "Coordination, Overload and Team Performance: Effects of Team Communication Strategies," in: *Proceedings of the 1998 ACM conference on Computer supported cooperative work*. Seattle, Washington, USA: ACM, pp. 275-284.

Glaser, B. G. 1998. *Doing Grounded Theory: Issues and Discussions*. Mill Valley, CA: Sociology Press.

Gosain, S., Lee, Z., and Kim, Y. 2005. "The Management of Cross-Functional Inter-Dependencies in Erp Implementations: Emergent Coordination Patterns," *European Journal of Information Systems* (14:4), pp. 371-387.

Gregory, R. W., Beck, R., and Keil, M. 2013. "Control Balancing in Information Systems Development Offshore Projects," *MIS Quarterly* (37:4), pp. 1211-A1214.

Gregory, R. W., Keil, M., Muntermann, J., and Mähring, M. 2015. "Paradoxes and the Nature of Ambidexterity in It Transformation Programs," *Information Systems Research* (26:1), pp. 57-80.

Hart, S., and Banbury, C. 1994. "How Strategy-Making Processes Can Make a Difference," *Strategic Management Journal* (15:4), pp. 251-269.

Hossain, L. 2009. "Effect of Organisational Position and Network Centrality on Project Coordination," *International Journal of Project Management* (27:7), pp. 680-689.

Hsu, J. S.-C., Shih, S.-P., Chiang, J. C., and Liu, J. Y.-C. 2012. "The Impact of Transactive Memory Systems on Is Development Teams' Coordination, Communication, and Performance," *International Journal of Project Management* (30:3), pp. 329-340.

Jarzabkowski, P. A., Lê, J. K., and Feldman, M. S. 2012. "Toward a Theory of Coordinating: Creating Coordinating Mechanisms in Practice," *Organization Science* (23:4), pp. 907-927.

Jiang, J. J., Chang, J. Y. T., Chen, H.-G., Wang, E. T. G., and Klein, G. 2014. "Achieving It Program Goals with Integrative Conflict Management," *Journal of management information systems* (31:1), pp. 79-110.

Keith, M., Demirkan, H., and Goul, M. 2013. "Service-Oriented Methodology for Systems Development," *Journal of Management Information Systems* (30:1), pp. 227-260.

Khan, M. R., Fernández, W. D., and Jiang, J. J. 2014. "Interdependencies and Is Programme Coordination and Control," ACIS.

Kraut, R. E., and Streeter, L. A. 1995. "Coordination in Software Development," *Communications of ACM* (38:3), pp. 69-81.

Lacity, M. C., Khan, S. A., and Willcocks, L. P. 2009. "A Review of the It Outsourcing Literature: Insights for Practice," *The Journal of Strategic Information Systems* (18:3), pp. 130-146.

Langley, A., and Abdallah, C. 2011. "Templates and Turns in Qualitative Studies of Strategy and Management," in *Building Methodological Bridges*. Emerald Group Publishing Limited, pp. 201–235.

Langley, A., Smallman, C., Tsoukas, H., and Van de Ven, A. H. 2013. "Process Studies of Change in Organization and Management: Unveiling Temporality, Activity, and Flow," *Academy of Management Journal* (56:1), pp. 1-13.

Leidner, D. E., Pan, G., and Pan, S. L. 2009. "The Role of It in Crisis Response: Lessons from the Sars and Asian Tsunami Disasters," *The Journal of Strategic Information Systems* (18:2), pp. 80-99.

Locke, K. 2001. *Grounded Theory in Management Research*. London: SAGE Publications.

Lowry, P. B., Roberts, T. L., Dean, D. L., and Marakas, G. 2009. "Toward Building Self-Sustaining Groups in Pcr-Based Tasks through Implicit Coordination: The Case of Heuristic Evaluation," *Journal of the Association for Information Systems* (10:3), pp. 170-195.

Lycett, M., Rassau, A., and Danson, J. 2004. "Programme Management: A Critical Review," *International Journal of Project Management* (22:4), pp. 289-299.

Mackenzie, K. D. 2000. "Processes and Their Frameworks," *Management Science* (46:1), pp. 110-125.

Malone, T. W., and Crowston, K. 1990. "What Is Coordination Theory and How Can It Help Design Cooperative Work Systems?," in: *Proceedings of the 1990 ACM conference on Computer-supported cooperative work*. Los Angeles, California, USA: ACM, pp. 357-370.

Malone, T. W., and Crowston, K. 1994. "The Interdisciplinary Study of Coordination," *ACM Computing Surveys* (26:1), pp. 87-119.

Mani, D., Srikanth, K., and Bharadwaj, A. 2014. "Efficacy of R&D Work in Offshore Captive Centers: An Empirical Study of Task Characteristics, Coordination Mechanisms, and Performance," *Information Systems Research* (25:4), pp. 846-864.

Markus, M. L. 1994. "Electronic Mail as the Medium of Managerial Choice," *Organization Science* (5:4), pp. 502-527.

Markus, M. L., and Robey, D. 1988. "Information Technology and Organizational Change: Causal Structure in Theory and Research," *Management Science* (34:5), pp. 583-598.

Mastrogiacomo, S., Missonier, S., and Bonazzi, R. 2014. "Talk before It's Too Late: Reconsidering the Role of Conversation in Information Systems Project Management," *Journal of Management Information Systems* (31:1), pp. 44-78.

Maylor, H., Brady, T., Cooke-Davies, T., and Hodgson, D. 2006. "From Projectification to Programmification," *International Journal of Project Management* (24:8), pp. 663-674.

McElroy, W. 1996. "Implementing Strategic Change through Projects," *International Journal of Project Management* (14:6), pp. 325-329.

McGrath, J. E., Arrow, H., and Berdahl, J. L. 1999. "Cooperation and Conflict as Manifestations of Coordination in Small Groups," *Polish Psychological Bulletin* (30:1), pp. 1-14.

Menon, A., Jaworski, B. J., and Kohli, A. K. 1997. "Product Quality: Impact of Interdepartmental Interactions," *Journal of the Academy of Marketing Science* (25:3), pp. 187-200.

Mingers, J. 2001. "Combining Is Research Methods: Towards a Pluralist Methodology," *Information Systems Research* (12:3), pp. 240-259.

Moenaert, R. K., and Souder, W. E. 1990. "An Information Transfer Model for Integrating Marketing and R&D Personnel in New Product Development Projects," *Journal of Product Innovation Management* (7:2), pp. 91-107.

Napier, N. P., Mathiassen, L., and Robey, D. 2011. "Building Contextual Ambidexterity in a Software Company to Improve Firm-Level Coordination," *European Journal of Information Systems* (20:6), pp. 674-690.

Newman, M., and Robey, D. 1992. "A Social Process Model of User-Analyst Relationships," *MIS Quarterly* (16:2), pp. 249-266.

Ning, N., and Johnston, E. W. 2009. "Using Multi-Agent Simulation to Explore the Contribution of Facilitation to Gss Transition," *Journal of the Association for Information Systems* (10:3), pp. 252-277.

Okhuysen, G. A., and Bechky, B. A. 2009. "10 Coordination in Organizations: An Integrative Perspective," *The Academy of Management Annals* (3:1), pp. 463-502.

Orlikowski, W. J. 1993. "Case Tools as Organizational Change: Investigating Incremental and Radical Changes in Systems Development," *MIS Quarterly* (17:3), pp. 309-340.

Parolia, N., Jiang, J. J., Klein, G., and Sheu, T. S. 2011. "The Contribution of Resource Interdependence to It Program Performance: A Social Interdependence Perspective," *International Journal of Project Management* (29:3), pp. 313-324.

Partington, D., Pellegrinelli, S., and Young, M. 2005. "Attributes and Levels of Programme Management Competence: An Interpretive Study," *International Journal of Project Management* (23:2), pp. 87-95.

Pellegrinelli, S. 1997. "Programme Management: Organising Project-Based Change," *International Journal of Project Management* (15:3), pp. 141-149.

Pellegrinelli, S. 2011. "What's in a Name: Project or Programme?," *International Journal of Project Management* (29:2), pp. 232-240.

Pellegrinelli, S., Murray-Webster, R., and Turner, N. 2015. "Facilitating Organizational Ambidexterity through the Complementary Use of Projects and Programs," *International Journal of Project Management* (33:1), pp. 153-164.

Perry, C. 1998. "A Structured Approach for Presenting Theses," *Australasian Marketing Journal (AMJ)* (6:1), pp. 63-85.

Pinto, M. B., Pinto, J. K., and Prescott, J. E. 1993. "Antecedents and Consequences of Project Team Cross-Functional Cooperation," *Management Science* (39:10), pp. 1281-1297.

Quinn, R. W., and Dutton, J. E. 2005. "Coordination as Energy-in-Conversation," *Academy of Management Review* (30:1), pp. 36-57.

Ren, Y., Kiesler, S., and Fussell, S. R. 2008. "Multiple Group Coordination in Complex and Dynamic Task Environments: Interruptions, Coping Mechanisms, and Technology Recommendations," *Journal of Management Information Systems* (25:1), pp. 105-130.

Ribbers, P. M. A., and Schoo, K.-C. 2002. "Program Management and Complexity of Erp Implementations," *Engineering Management Journal* (14:2), p. 45.

Rico, R., Sánchez-Manzanares, M., Gil, F., and Gibson, C. 2008. "Team Implicit Coordination Processes: A Team Knowledge-Based Approach," *Academy of Management Review* (33:1), pp. 163-184.

Rijke, J., van Herk, S., Zevenbergen, C., Ashley, R., Hertogh, M., and ten Heuvelhof, E. 2014. "Adaptive Programme Management through a Balanced Performance/Strategy Oriented Focus," *International Journal of Project Management* (32:7), pp. 1197-1209.

Sicotte, H., and Langley, A. 2000. "Integration Mechanisms and R&D Project Performance," *Journal of Engineering and Technology Management* (17:1), pp. 1-37.

Söderlund, J. 2004. "Building Theories of Project Management: Past Research, Questions for the Future," *International Journal of Project Management* (22:3), pp. 183-191.

Souder, W. E., and Moenaert, R. K. 1992. "Integrating Marketing and R&D Project Personnel within Innovation Projects: An Information Uncertainty Model," *Journal of Management Studies* (29:4), pp. 485-512.

Spector, P. E., and Meier, L. L. 2014. "Methodologies for the Study of Organizational Behavior Processes: How to Find Your Keys in the Dark," *Journal of Organizational Behavior* (35:8), pp. 1109-1119.

Strode, D. E., Huff, S. L., Hope, B., and Link, S. 2012. "Coordination in Co-Located Agile Software Development Projects," *Journal of Systems and Software* (85:6), pp. 1222-1238.

Tan, F. T. C., Pan, S. L., and Zuo, M. 2014. "The Role of Organisational Interdependencies and Asset Orchestration in Business Integration: A Case Study of M.Com," *International Journal of Information Management* (34:6), pp. 780-784.

Thiry, M. 2002. "Combining Value and Project Management into an Effective Programme Management Model," *International Journal of Project Management* (20:3), pp. 221-227.

Thompson, J. D. 1967. *Organizations in Action*. New York: McGraw-Hill.

Tillquist, J., King, J. L., and Woo, C. 2002. "A Representational Scheme for Analyzing Information Technology and Organizational Dependency," *MIS Quarterly* (26:2), pp. 91-118.

Unger, B. N., Gemünden, H. G., and Aubry, M. 2012. "The Three Roles of a Project Portfolio Management Office: Their Impact on Portfolio Management Execution and Success," *International Journal of Project Management* (30:5), pp. 608-620.

Urquhart, C., and Fernández, W. 2013. "Using Grounded Theory Method in Information Systems: The Researcher as Blank Slate and Other Myths," *Journal of Information Technology* (28:3), pp. 224-236.

Van De Ven, A. H., Delbecq, A. L., and Koenig, R., Jr. 1976. "Determinants of Coordination Modes within Organizations," *American Sociological Review* (41:2), pp. 322-338.

Walsh, I., Holton, J. A., Bailyn, L., Fernandez, W., Levina, N., and Glaser, B. 2015. "What Grounded Theory Is … a Critically Reflective Conversation among Scholars," *Organizational Research Methods*).

Walsham, G. 1995. "Interpretive Case Studies in Is Research: Nature and Method," *European Journal of Information Systems* (4:2), pp. 74-81.

Wang, E. T. G., and Tai, J. C. F. 2003. "Factors Affecting Information Systems Planning Effectiveness: Organizational Contexts and Planning Systems Dimensions," *Information & Management* (40:4), pp. 287-303.

Williams, C. K., and Karahanna, E. 2013. "Causal Explanation in the Coordinating Process: A Critical Realist Case Study of Federated It Governance Structures," *MIS Quarterly* (37), pp. 933-A938.

Wiredu, G. O. 2011. "Understanding the Functions of Teleconferences for Coordinating Global Software Development Projects," *Information Systems Journal* (21:2), pp. 175-194.

Xiao, X., Califf, C. B., Sarker, S., and Sarker, S. 2013. "Ict Innovation in Emerging Economies: A Review of the Existing Literature and a Framework for Future Research," *Journal of Information Technology* (28:4), pp. 264-278.

Zippel-Schultz, B., and Schultz, C. 2011. "Mediated and Moderated Effects of Business and Project Planning on Innovation Projects in Hospitals," *Creativity and Innovation Management* (20:4), pp. 296-310.

APPENDIX A
Concept matrix of programme management definitions

	Multi-project synergy			Strategic intent					Significant effort			
	Group of projects	Efficiency/Synergy/ Coordination	Allied Activities (e.g. resource allocation, interdependencies)	Organisational Goals/ Strategy/Major benefits	Delivering Change	Cyclic/Reiterative	Changing business needs/adaptation	Basis of project definition	Long Term	Major Project	Complexity, Ambiguity	Organisation-wide/ cross functional
(Archibald 1992)	Y	Y	-	-	-	-	-	-	Y	-	Y	-
(Hatzakis, Lycett et al. 2007)	Y	Y	-	Y	-	-	-	-	-	-	-	-
(Elbanna 2010) PRINCE2	Y	Y	Y	-	-	-	-	-	-	-	-	-
(Lycett, Rassau et al. 2004)	Y	Y	Y	Y	-	-	-	-	-	-	-	-
(McElroy 1996)	Y	Y	-	Y	-	-	-	Y	Y	-	-	-
(Pellegrinelli 1994)	Y	Y	-	Y	Y	-	Y	Y	-	-	-	Y
(Pellegrinelli 1997)	Y	Y	Y	Y	Y	-	Y	Y	-	-	-	Y
(Grundy 1998)	Y	-	-	Y	-	-	Y	-	Y	Y	Y	Y
(Pellegrinelli 2011)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-
(Thiry 2002)	Y	Y	Y	Y	Y	-	-	-	Y	Y	Y	-
(Artto, Martinsuo et al. 2009) OGC 2007	Y	-	Y	Y	-	-	-	-	Y	-	-	-
(Artto, Martinsuo et al. 2009) PMI 2006	Y	Y	Y	Y	-	-	-	-	Y	-	Y	-
(Young, Young et al. 2012) OGC 2009	Y	Y	Y	Y	-	-	-	-	Y	-	-	-
(Pellegrinelli 2002)	Y	Y	-	Y	-	-	-	Y	-	-	-	-
(Thiry 2004)	Y	-	Y	Y	Y	Y	Y	-	Y	-	Y	-
(Ferns 1991)	Y	Y	Y	Y	Y	Y	Y	-	-	Y	Y	-
(Turner and Speiser 1992)	Y	Y	Y	Y	-	Y	Y	-	-	Y	Y	-
(Gray and Bamford 1999)	Y	Y	-	-	-	-	-	-	-	Y	Y	-
(Caldwell 2003)	-	Y	Y	Y	-	-	-	-	Y	-	Y	
(Cleland 1966)	-	-	Y	Y	-	-	-	-	-	-	-	-
(Cash Jr., Earl et al. 2008)	Y	Y	Y	Y	Y	-	-	-	-	-	Y	Y
(Partington, Pellegrinelli et al. 2005)	Y	Y	Y	Y	-	-	-	-	-	-	-	-
(Gray 1997) BT	Y	-	-	Y	-	-	-	-	-	-	-	-
(Lycett, Rassau et al. 2004) Glaries 1999	-	-	-	-	-	-	-	-	Y	-	-	-
(Ribbers and Schoo 2002)	Y	-	Y	-	Y	-	-	Y	-	-	-	Y

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APPENDIX B
Summary of review articles

	Work	Context	Discipl-ine	Sub-area	Theoretical Lens	Method	Important findings	Shortcoming with respect to programme coordination
1	(Gosain, Lee, & Kim, 2005)	Project Management	IT/IS	ERP project implementation	None	Case study (four cases)	The study identified three coordination patterns: (a) lean pattern based on intricate planning (b) rich pattern based on structural arrangements and cultural interventions, and (c) mediation pattern based on executive mandate or a dominant functional unit.	Only focuses on patterns; does not explain how patterns emerge and how they work? Adopts variance approach.
2	(Rijke et al., 2014)	Programme Management	Enginee ring	Complex infrastructure engineering projects	Coordination Theory	Case study (single case)	Appropriate programme coordination to monitor progress of intermediate milestones and management of project performance are important for programme success.	No elaboration of how appropriate coordination might be achieved. Coordination is not the central focus.
3	(Hossain & Wu, 2009)	Project Management	Energy, water and power	Infrastructure projects	Coordination Theory and Collective Mind (sensemaking)	Data clustering (content analysis)	Network centrality has profound effect on organisation level coordination. Network centrality is more important than hierarchical authority for coordination purposes.	Considers the connectedness of actor's role as proxy measure of their coordinative ability. Only explains who is better suited for assuming a coordinating role in an organisation with multiple projects.
4	(Hossain, 2009)	Project Management	Energy, water and power	Infrastructure projects	Coordination Theory and Collective Mind (sensemaking)	Data clustering (content analysis)	Highly centralised individuals are able to coordinate projects more than others who have less centralised position in the network.	Considers the connectedness of actor's role as proxy measure of their coordinative ability. Only explains who is better suited for assuming a coordinating role in a project.
5	(Ahern, Leavy, & Byrne, 2014)	Project Management		Complex projects	Knowledge Management	Case study (two cases)	For complex projects 'total planning' approach is not suitable. 'Bounded planning' is proposed for the coordination of emergent project knowledge. A coordinating mechanism, called "common will of mutual interest" has been proposed as a distributed tacit dimension of coordination.	Works only when mutual interest or a sense of common purpose exists; which is difficult to obtain in large multi-team programmes, as indicated by recent programme management research such as Gregory et al 2015.

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#	Authors				Theory	Method	Finding	Limitation
6	(Hsu, Shih, Chiang, & Liu, 2012)	Project Management	IT/IS	ISD projects	Transactive Memory Theory	Survey (n=236)	Studies the effect of improved communication and coordination on project success. Organising project team as transactive memory system has a positive effect on coordination and team performance.	Transactive memory is used as antecedent for coordination and communication. Takes variance approach. Central focus is project success and coordination is a mediator.
7	(Adenfelt, 2010)	Project Management	IT/IS	transnational software development project	None	Case study (single)	If project management adopts coordination style that does not actively encourage and facilitate communication among sub-projects, it affects the performance of a transnational project.	Studied whether coordination improves knowledge sharing among project team members. Not a direct study of coordination itself.
8	(Wiredu, 2011)	Project Management	IT/IS	Global software development	Information processing theory	Case study (single)	Explained how electronic meetings are used as coordination tools by project managers in globally distributed software development projects.	Investigated the effectiveness of one particular coordination mechanism.
9	(Mani, Srikanth, & Bharadwaj, 2014)	Project Management	N/A	Off shore R&D projects	Coordination Theory	Survey (n=132)	Modularization of work (i.e. activity breakdown structures) are largely ineffective when the underlying tasks are less routinized, less analysable. Coordination based on information sharing is effective when tasks are less familiar.	Restricted to effect of information sharing and planning based coordination mechanisms on project performance. Does not explain how coordination actually occurs.
10	(Cummings, Espinosa, & Pickering, 2009)	Project Management	ICT hardware and software	Globally distributed projects	Coordination Theory	Survey (n=675)	Temporal boundaries are more difficult to bridge while coordinating via communication technologies as compared to spatial boundaries because synchronous communication is hindered by time differences.	Limited to studying the effect of ICT enabled coordination tools in projects where team is distributed in different time zones.
11	(Colazo & Yulin, 2010)	Project Management	IT/IS	Virtual teams, open source software development	Coordination Theory	Archival data analysis (software metrics analysis)	The coordination needs for open source software (OSS) teams are different from other virtual teams due to added dimension of temporal difference. Instead of impeding performance, temporal differences improve the performance of OSS virtual teams when the project has less complexity.	Studies a niche area of open source software development dominated by volunteers that is vastly different then working in traditional organisations.
12	(Chua & Yeow, 2010)	Project Management	IT/IS	Open source software development	Coordination Theory and Ordering System	case study (three cases)	Coordination practices in cross-project environment change over time with the changes in the interdependent artefact being developed by another project.	Studies a niche area of open source software development dominated by volunteers that is vastly different then working in traditional organisations.

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#	Reference	Domain	IT/IS	Context	Theory	Method	Description	Limitation
13	(Ning & Johnston, 2009)	Software Adoption	IT/IS	Collaboration Engineering	Coordination Theory and Game Theory	Simulation Modelling	Coordination is not always bidirectional; sometimes only one stakeholder exerts all the effort of coordinating with other parties. Identified which facilitation practises (each of which is considered a coordination activity) such as training, championing, and technical support, help in sustained adoption of groups support software.	Limited only to studying the effects of various coordination mechanisms on adoption of group support software.
14	(Lowry, Roberts, Dean, & Marakas, 2009)	Software Development	IT/IS	Software Engineering	Coordination Theory and Collective Mind (sensemaking)	Experiment (417 participants in 107 groups)	Identified the following activities that support implicit coordination: training, process instructions, group memory, and group awareness. Important productivity improvements can be achieved through implicit coordination.	Restricted to implicit coordination. Not integrative.
15	(Napier, Mathiassen, & Robey, 2011)	Firm-level	IT/IS	ISD projects, IS products	Contextual ambidexterity	Action research (single case)	Paradox of continuing existing products or doing new innovations requires software firms to be ambidextrous. Study suggests a four stage approach of improving firm-level coordination of projects and products by inculcating contextual ambidexterity.	Explains only one coordination mechanism i.e. C-level project steering committee for coordination of projects across the organisation.
16	(Keith, Demirkan, & Goul, 2013)	Project Management	IT/IS	ISD projects	Coordination Theory, Interdependence Theory	Design science (single case)	Agile and waterfall software development require different coordination mechanisms i.e. informal and formal respectively. Authors develop a hybrid software development model based on service oriented methodology. Increased formal coordination in the pre-design stage decreases the need for informal coordination in the post-design stage.	Limited only to studying the change in frequency of using formal and informal coordination mechanisms after implementing a new software development methodology.
17	(Mastrogiacomo, Missonier, & Bonazzi, 2014)	Project Management	IT/IS	Single Project	Clark's Joint Activity Theory	Design science (three cases)	Conversation among team members is the key to effective coordination.	Applies only to one team with control over all members of the team for developing shared purpose. Does not apply to cross functional teams, and multiple teams in a programme, where shared joint purpose may or may not exist. Also excludes non cooperative settings.

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#	Author	Domain	Category	Context	Theory	Method	Findings	Limitations
18	(Ren, Kiesler, & Fussell, 2008)	Hospital Management	IT in medical coordination	Complex, high risk organisation	Coordination Theory	Case study (single)	Costly coordination breakdowns in multiple groups can be reduced by introducing context aware systems (location enabled devices). Proposed how adoption of context aware IT coordination software can help smooth the treatment of emergencies in hospital operating rooms.	Limited to studying the effect of one coordination mechanism i.e. context aware software system (location enabled devices) to improve emergency response in hospitals.
19	(Espinosa, Slaughter, Kraut, & Herbsleb, 2007)	Project Management	IT/IS	Geographically distributed software development	Coordination Theory	Interview (n=36)	Software development teams have three distinct types of coordination needs—technical, temporal, and process. Geographic distance hinders thorough communication.	Focused on effect of team knowledge and task knowledge on coordination effectiveness. Does not explain the coordination process itself.
20	(Andres & Zmud, 2001)	Project Management	IT/IS	Software Development	Coordination Theory and Information Processing Theory	Experiment (n=80)	An organic coordination strategy (informal, cooperative, and decentralized) leads to more successful projects than a mechanistic coordination strategy (formal, controlling, and centralized).	Studies effects of various coordination strategies on project success. Does not explain how coordination occurs.
21	(Abraham & Junglas, 2011)	Firm-level	IT/IS, Change Management	IS projects	Business Process Change Model	Case study (single)	Successful implementation of IS leads to transformational changes in coordination and culture in the organisation.	Studies the use of only one mechanism (coordination software) for achieving cost efficiencies in operations.
22	(Leidner, Pan, & Pan, 2009)	Crisis Management	IT in Crisis Response	Disaster/Crisis Response	Resource Based View and Coordination Theory	Case study (single)	Coordination in unstable environments is considerably different than that in stable environments.	Limited to a niche area of crisis response. But can be interpreted to suggest that coordinating in programmes will be much different than coordinating in routine operations environment.
23	(Dibbern, Winkler, & Heinzl, 2008)	Project Management	IT/IS	Offshore outsourced ISD projects	Knowledge based view of firm and transaction cost economics	Case study (six cases)	Significant coordination costs are faced by both the vendor and the client in outsourcing knowledge based projects.	Limited to the level of coordination effort for outsourced projects. Does not describe coordinating activities.
24	(Williams & Karahanna, 2013)	IT Governance	IT/IS	Large public organisation	Critical Realist	Case study (two cases)	Identified two causal mechanisms (consensus making and unit aligning) that help to explain the outcomes observed in two coordinating efforts in a single, public sector organization.	Limited to corporate governance of IT throughout the organisation. Does not study project or programmes directly.

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		IT/IS	Change Management	IT enabled strategic change	Coordination Theory and Resource Dependence Theory	Case study (single)	Proposed a new method for representing dependencies in organisation, called dependency network diagrams (DNDs).	Proposes a modelling tool for dependency management. Does not explain the coordination process.
25	(Tillquist, King, & Woo, 2002)		Change Management					
26	(Dietrich, Kujala, & Artto, 2013)		Project Management	Multi-team project	None	Case study (six cases)	Identified three coordination patterns in multi-team projects: centralized coordination, decentralized coordination, and balanced coordination.	Studies contingency patterns of coordinating mechanisms. Does not explain how and why these mechanisms evolve.

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